



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,740	01/16/2004	Wade Thomas Cathey JR.	414671	6369
30955	7590	07/08/2005		
LATHROP & GAGE LC 4845 PEARL EAST CIRCLE SUITE 300 BOULDER, CO 80301			EXAMINER CHANG, AUDREY Y	
			ART UNIT 2872	PAPER NUMBER

DATE MAILED: 07/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/758,740	<b>Applicant(s)</b> CATHEY ET AL.	
	<b>Examiner</b> Audrey Y. Chang	<b>Art Unit</b> 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 May 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 1-3, 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7, 8 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Remark*

- This Office Action is in response to applicant's amendment filed on May 5, 2005, which has been entered into the file.
- By this amendment, the applicant has amended claims 1, 3, 7, and 9-11 and has canceled claims 4-6.
- Claims 1-3 and 7-11 remain pending in this application.

### *Election/Restrictions*

1. Newly amended claims 1-3 and 9-10 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

**Species A:** Claims 1-3 and 9-10 have been amended to include the feature "the modifying phase, of the image, **does not reduce** an optical bandpass limited by an aperture of the optical imaging system,

**Species B:** Claims 7-8 have been amended to include the feature "optical image is limited in frequency content by an aperture of the lens **or** of the optical mask".

Species A is **not supported** by the specification and therefore **are not directed** to the originally presentation of the invention. Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 1-3 and 9-10 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Claims 7-8 and 11 remain pending in this application.
3. The objections to the drawings set forth in the previous Office Action are withdrawn in response to applicant's amendment.

Art Unit: 2872

4. The rejections to claims 7-8 and 11 under 35 USC 112, first paragraph, concerning the critical elements are withdrawn in response to applicant's amendment.

***Information Disclosure Statement***

5. The information disclosure statement filed on January 16, 2004 contains a list of more than 150 references yet **does not** include a concise explanation of the relevance. It has been placed in the application file, but the information referred to therein has not been considered.

In response to applicant's arguments concerning the requirements of MPEP, the applicant is respectfully requested to document their "doubts" explicitly concerning each reference of the list whether being "material" to the merits of the invention or not so that the examiner can consider them properly.

***Claim Objections***

6. **Claim 11 is objected to because of the following informalities:**

(1). The symbol "Ψ" recited in claim 11 is confusing and indefinite since the claim fails to define what does this symbol stand for. Furthermore, it is not clear what is considered to be the "range of Ψ". It is not clear if this is referred to a spatial frequency or not. The scope of the claim therefore is confusing and not clear.

**Appropriated clarifications are required.**

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2872

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Claim 7 is rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Kubo et al (PN. 4,480,896).**

Kubo et al teaches an *imaging optical system* such as a photographic system having a sharp *objective lens* and an *optical mask* (Figure 1) having different phase modulation portions (11 and 12) for forming an optical image. Kubo teaches that the optical mask creates phase difference to the wavefront which therefore modulates the phase of the wavefront so that the *modulated* optical transfer function, which is the optical transfer function for the imaging optical system, does not have value zero over a range of spatial frequency, (please see Figure 2). It is implicitly true that the imaging optical system such as the photographic system has a detector, such as a film or a CCD detector, for detecting the optical image. Kubo et al further teaches that the optical mask also modulating the wavefront of the light from the sharp objective lens to make the imaging system has a *soft focus effect* which implicitly means that it creates an extend of the depth of focus that is larger than the focus of the imaging system without the optical mask, (please see column 1-2).

**This reference has therefore anticipated the claims.**

### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2872

**10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kubo et al and in view of the article "Optical/digital incoherent image processing for extended depth of field" by Poon et al (Applied Optics Vol. 26, No. 21, page 4612).**

The optical mask taught by Kubo et al that modulates phase of the wavefront and creates soft focus effect for an optical imaging system including a sharp focus objective lens as described for claim 7 above has met all the limitations of the claims. It is implicitly true that an imaging system has a detector for detecting the optical image however this reference does not teach explicitly to include a post-processor for processing the detected optical image to reverse the blurring effect.

Poon et al in the same field of endeavor teaches an *optical /digital image processing apparatus* and *method* for generating an optical image wherein the apparatus comprises an *optical lens* and an *optical mask* for forming the optical image and modulating a wavefront such that *an extended field of depth* is resulted and *zeros* of the *optical transfer function*, describing the optical functions of *both* the mask and the lens, are eliminated, (please see Figure 1-3, and the entire document). Poon et al further teaches to include *digital image* processing arrangement, serves as the post-processor, (please see Figure 5), including a *computer generated filter* to *reverse* or *compensating* the effects of the mask so that the lost image contrast in the detected image can be restored. The digital image processing arrangement certainly includes an image detector to transform the optical image into electronic image and digital image processor for processing the electronic image. The final electronic image from the optical/digital image process apparatus is clearer over the extended depth of focus as compared to the electronic image obtained without using the mask. It would then have been obvious to one skilled in the art to apply the teachings of Poon et al to apply this post-processing scheme to the detected image and to add this digital image process arrangement to the imaging system of Kubo et al for the benefit of allowing the blurring effect introduced by the optical mask be reversed or eliminated so that a clearer image can be obtained in the photographic imaging system.

11. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kubo et al (PN. 4,480,896).

Kubo et al teaches an *imaging optical system* such as a photographic system having a sharp *objective lens* and an *optical mask* (Figure 1) having different phase modulation portions (11 and 12) for forming an optical image. Kubo teaches that the optical mask creates phase difference to the wavefront which therefore modulates the phase of the wavefront so that the *modulated* optical transfer function, which is the optical transfer function for the imaging optical system, does not have value zero over a range of spatial frequency, (please see Figure 2). It is implicitly true that the imaging optical system such as the photographic system has a detector, such as a film or a CCD detector, for detecting the optical image. Kubo et al further teaches that the optical mask also modulating the wavefront of the light from the sharp objective lens to make the imaging system has a soft focus effect which implicitly means that it creates an extend of the depth of focus that is larger than focus of the imaging system without the optical mask, (please see column 1-2).

The feature concerning the "range  $\psi$ " cannot be examined since it is not defined and it is not clear what feature is being described.

### ***Double Patenting***

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the

Art Unit: 2872

conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13. **Claims 7-8 and 11 are provisionally rejected** under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 75, 87, 88, 94, 95 and 99 of copending Application No. 09/070,969. Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims recite a mask for altering phase such that the detected optical transfer function contains no zeros.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### ***Response to Arguments***

14. Applicant's arguments with respect to claims 7-8 and 11 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

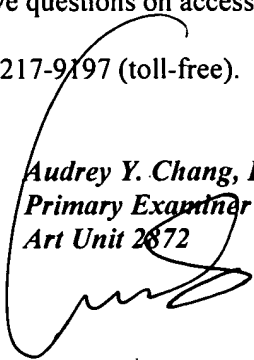
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the



Art Unit: 2872

PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Audrey Y. Chang, Ph.D.*  
*Primary Examiner*  
*Art Unit 2872*



A. Chang, Ph.D.